

Ponthieva luegii (Orchidaceae), a new taxon from the karst formations of Guatemala^a

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Abstract

A new species of lithophytic orchid, belonging to *Ponthieva* R. Brown, is described, illustrated and compared to *Ponthieva ephippium* Reichenbach f., its closest relative. This species is associated to the exposed karstic rocks which can be observed along the northern humid arc of Guatemala, a mountain complex with a karstic geologic base favouring high biodiversity. This particular habitat is described in detail.

Résumé

Ponthieva luegii (Orchidaceae), un nouveau taxon du paysage karstique guatémaltèque – Une nouvelle espèce d'orchidée lithophyte appartenant au genre *Ponthieva* est décrite, illustrée et comparée à l'espèce la plus proche, *Ponthieva ephippium* Reichenbach f. Elle est associée aux roches karstiques exposées qui se rencontrent le long de l'arc humide nord du Guatemala, complexe montagneux ayant une base géologique karstique, favorisant une grande biodiversité. Cet habitat particulier est ici présenté en détail.

Resumen

Ponthieva luegii, un nuevo registro del paisaje kárstico cobanero – Una nueva especie de orquídea litofítica es propuesta, asociada a rocas kársticas expuestas, estas se encuentran creciendo en el arco húmedo norte de Guatemala, un complejo montañoso caracterizado por ser una zona que

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tiene como base geológica el karst pro además un enorme riqueza en biodiversidad. La nueva especie perteneciente al género *Ponthieva* es descrita e ilustrada junto con la descripción de su hábitat.

Introduction

The orchid tribe Cranichideae Endlicher comprises terrestrial, lithophytic, and rarely epiphytic plants. The fleshy roots are verticillate or produced along either a thick and fleshy rhizome or a tuber. The leaves are convolute, not plicate, fleshy, spirally arranged, either in a basal rosette or along the erect part of the stem. The inflorescence is terminal, erect, racemose, with one to many flowers, often pubescent or glandular. The floral bracts are persistent. The flowers are resupinate or rarely non resupinate, usually small, often somewhat tubular and not fully open. The sepals are usually subsimilar, the lateral ones often somewhat oblique at base. The petals are generally thinner than the sepals, often adnate to the dorsal sepal, forming a cap (Pridgeon *et al.*, 2003). Within this tribe the best known group is the subtribe Cranichidinae Lindley comprising eight (Szlachetko & Rutkowski, 2000) or 9 (Dressler, 1993) genera and forming a monophyletic group (Salazar *et al.*, 2003). *Ponthieva* R. Brown belongs to this subtribe and comprises 62 species (WCSP, 2015) that are sympodial and terrestrial or lithophytic. They can be observed at low to high altitudes, on hills or in mountain rain forests, forests with *Sphagnum*, and thickets, in the entire Neotropics, from southern United States to Bolivia and Argentina (Alrich & Higgins, 2008).

The gynostemium is usually short, erect, rather massive, often apically inflated, with the column part shorter than the anther, lacking a foot; the base of the anther is placed below the base of the stigma, the anther is erect, oblong or ovate, mobile, 2-cleft, the two parts parallel; the filament is entire or fused to the column for its greater part; the connective is short but very thick, often enlarged at the apex. The 4 pollinia are ovoid to oblong-ovoid, compact; the caudicles are inconspicuous, made of the thin pollinia apex. The staminodes are united to the filament and the style and/or the base of the stigma, forming a prominent dorsal clinandrium, generally thick, massive and spacious. The stigma is horizontal to subventral, obscurely 3-lobed, confluent, ovate or elliptic (Szlachetko & Rutkowski, 2000).

Seven species have been registered for Guatemala in the middle of the previous century (Ames & Correll, 1953-1954) and eleven in the most recent lists (Archila, 2014). A new one has been discovered by the senior author in the Department of Alta Verapaz. It forms a few populations growing on karstic rocks and comprising 10 to 50 individuals each, on a area of 200 m². It is described and illustrated in this article.

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Ponthieva luegii* Archila, Szlachetko & Chiron, *sp. nov.

Fig. 1 & 2

Herba lithophyta nana, glabra cum fructo verrucoso. Flos alba roseomaculata.

Haec herba Ponthieva ephippium Rchb. f. similis est sed inflorescencia bracteis floribusque glabris, floribus minoribus, adaxiale secus nervuram medianam roseomaculatis, bracteis floralibus brevis, fructis verrucosis, petalis divergentibus (versus parallelis) apice elongatis obtusisque (versus curtis orbicularibusque), petalorum limborum lobo orbiculare (versus oblique obtuso), sepalis lateralibus oblique ellipticis (versus ovatis), differt.

Type: Guatemala, Alta Verapaz, Se Quib, colectado por Fredy Archila, Francisco Archila, Javier Archila y Oscar Rodrigo Archila sobre rocas kársticas, Diciembre 2014, FA-sn (HT: BIGU).

Etymology: the new entity is dedicated to Christian Lueg, a German grower of terrestrial orchids, for his important help with his plants in the study of the genus *Cypripedium*.

Plant small; leaves elliptic, 3 cm long, 1.3 cm wide, apically acute; inflorescence 6 cm long producing 3-6 flowers; flower glabrous, white with a pink mark on the dorsal face of the sepals, along the central nerve, lip with a yellow spot on the base and a green mark on the lateral lobes, both marks reminding of a flying bird; floral bracts 2 mm long, glabrous; pedicel ovary 4.5 mm long; dorsal sepal obovate, 4.1 mm long, 2.1 mm wide, apically obtuse; lateral sepals ovate, oblique, 4.8 mm long, 4.2 mm wide, apically acute; petals 3.7 mm long, 1.9 mm wide, obliquely dolabriform with the ventral margin orbicular, the base obliquely linear, the separation zone between the ventral part and the base folded, divergent and not united to the dorsal sepal, apically acute; labellum 3-lobed after a trapezoid base, lateral lobes 1.3 mm long and wide, orbicular, somewhat truncate at the base, apical lobe linear, 1.3 mm long, 0.4 mm wide, apically acuminate; column 2.7 mm long, obliquely oblong, stigma rounded, inserted into a

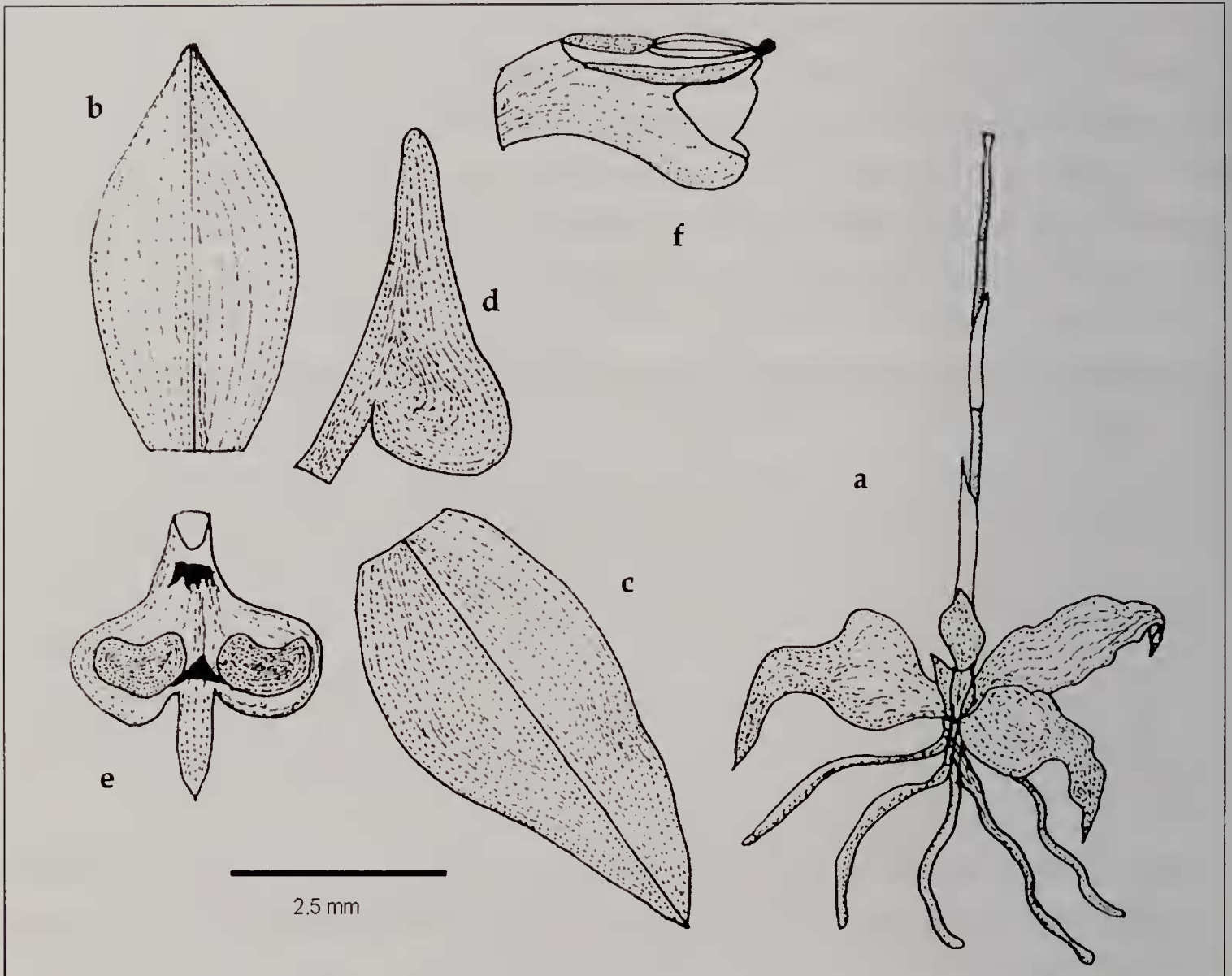


Fig. 1: *Ponthieva luegii*

a: plant – b: dorsal sepal – c: lateral sepal – d: petal – e: labellum – f: column (drawing: F.Archila)



Fig. 2: *Ponthieva luegii*

(ph. F.Archila)

thick oblique cavity, rostellum apically recurved, anther elliptique, with an elliptic and swollen connective; fruit obovate, 9 mm long, 3.3 mm wide, irregularly papulose verrucose, seed very small, ovate oblong and oblique, dull brown (Fig. 3).

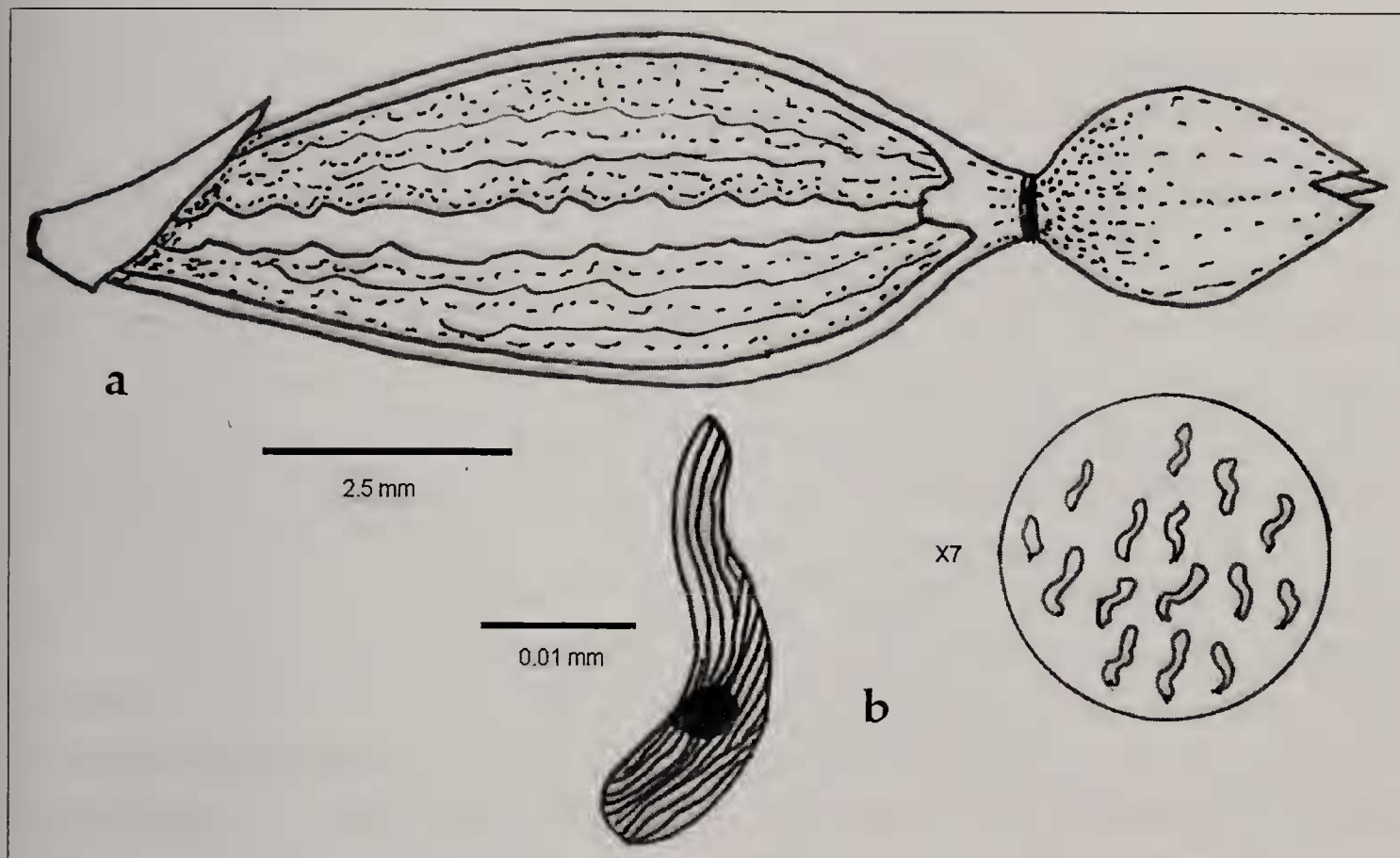


Fig. 3: fruit [a] and seeds [b] of *Ponthieva luegii*
(drawing : F.Archila)

Discussion: this species is closely related to *Ponthieva ephippium* Reichenbach f. (of which a good drawing is provided by Hamer, 1985) from which it can be distinguished by its smaller flowers with pink stain along the central nerve on the dorsal face of the sepals, its short floral bracts, its glabrous inflorescence, flowers and bracts, its verrucose fruits, its divergent petals (parallel in *P. ephippium*), the form of the petal ventral lobe (orbicular in *P. luegii*, obliquely obtuse in *P. ephippium*), its petal apex elongate and obtuse (*versus* short and orbicular in *P. ephippium*) and its lateral sepals obliquely elliptic (*versus* ovate).

Habitat: plant growing in cracks on karstic rocks. The regional geologic frame of Guatemala is compound of various terrains which are the result of a particular geologic history. Guatemala is located between three tectonic plates (North American Plate, Caribbean Plate, Cocos Plate) whose margins are, all in all, made of igneous volcanic rocks in the South, metamorphic rocks in the Centre, and large sequences of sedimentary chalky rocks in the

North. The chalky rocks, mainly made of calcite (CaCO_3), constitute about 50% of the national land and result from chemical sedimentation processes that occurred in the deep sea during various geologic times from the Paleozoic to the Tertiary era. Two of these formations, specially important because of their large dimensions, are the Chóchal formation and the Cobán formation. The former is a sequence of chalky rocks arranged in a superficial reef platform build during the late Paleozoic whereas the latter covers a large part of the northern Guatemala and is made of chalky rocks formed during the Cretaceous period arranged in a superficial carbonaceous platform. These carbonate formations, specially the Cretaceous chalky rocks, show an important karstic development. This name refers to a relief type which is the result of the dissolving of the chalky rocks due to the slow action of the weak acids present in water. These acids are formed from the carbon dioxide coming from atmosphere or produced by plants and bacteria: $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$. Calcite is dissolved producing Calcium bicarbonate, which is water-soluble and easily removed from the rock: $\text{H}_2\text{CO}_3 + \text{CaCO}_3 \rightarrow \text{CaHCO}_3 + \text{H}_2\text{O}$.

As with many chemical processes, the reaction speed increase with the temperature and, in spite of the fact that the quantity of Carbon dioxide in solution is greater when temperature is lower, dissolution is more intense in tropical regions due to the greater quantity of biogenic Carbon dioxide. Because of these factors and because the chalky rocks are the soluble rocks more common in the North of the country, the karstic process is present in nearly all the northern area independently of the local particular climatic conditions. The superficial karst, or exokarst, includes terrain forms as diverse as *dolinas* (depressions formed by subsidence), *sumideros* or drains (vertical holes originated from collapse and locally referred to as *siwanas*), rivers disappearing and reappearing, conical karst and tower karst. The subterranean karst, or endokarst, is made of a network of subterranean cavities forming a well developed system, creating many caves of various sizes. Other relief forms, referred to as karren or lapiaz, appear as small furrows dug on the rock by dissolving or erosion processes. These furrows are usually between some millimeters to some centimeters deep.

In the development of the karstic formations, some correlation is observed, mainly between the density and form of the *dolinas* and caves and the geological structures of the terrain. Distribution and form of the caves, for example, generally agree with the fault orientation whereas their abundance is generally associated with terrains with rather strong slopes.

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